



**CARDIAC SAFETY**  
RESEARCH CONSORTIUM  
— CSRC —

## Definition of CS for clinical trials and registries

What are the entry criteria?

# Interrelated Elements in Cardiogenic Shock Definitions

1) Definition of Cardiogenic Shock

2) Acuity/Staging

3) Phenotyping



Working Group #1

Working Group #2

## General Clinical Practice or Registries

- Cardiac disorder that results in both clinical and biochemical evidence of sustained tissue hypoperfusion

## Trials or Registries

- Cardiac disorder\* that results in a systolic blood pressure <90 mmHg for  $\geq 30$  min (or the need for vasopressors, inotropes and/or mechanical circulatory support to maintain systolic blood pressure  $\geq 90$  mmHg) *with* evidence of hypoperfusion<sup>†</sup>

### \* Hemodynamic Criteria (optional):

- Cardiac Index  $\leq 2.2$  L/min/m<sup>2</sup>

### <sup>†</sup>Hypoperfusion criteria ( $\geq 1$ of the following):

- Elevated serum lactate [ $>2$  mmol/L])
- Acute kidney injury (Creatine  $\geq 2$ xULN or oliguria (e.g., urine output  $<0.5$  mL/kg/hour))
- Acute hepatic injury (e.g., alanine aminotransferase [ALT] or aspartate aminotransferase [AST]  $>3$ x upper limit of normal)
- Cool or mottled extremities
- Altered mental status

# Acuity Staging of Cardiogenic Shock (Simplified SCAI Stages)

<b>E</b> <b>Extremis</b>	<ul style="list-style-type: none"> <li>Supported by multiple interventions, may have ongoing CPR or ECMO support</li> </ul>
<b>D</b> <b>Deteriorating</b>	<ul style="list-style-type: none"> <li>Patient who is deteriorating despite vasoactive or MCS interventions</li> </ul>
<b>C</b> <b>Classic</b>	<ul style="list-style-type: none"> <li>Patient has hypoperfusion requiring vasoactive or MCS support</li> </ul>
<b>B</b> <b>Beginning</b>	<ul style="list-style-type: none"> <li>Relative hypotension or tachycardia without hypoperfusion</li> </ul>
<b>A</b> <b>At Risk</b>	<ul style="list-style-type: none"> <li>Risk factor for CS without signs of symptoms</li> </ul>

## Trial or Registry Staging Criteria

**TABLE 1** Descriptors of shock stages: physical exam, biochemical markers and hemodynamics

Stage	Description	Physical exam/bedside findings	Biochemical markers	Hemodynamics
<b>A</b> At risk	A patient who is not currently experiencing signs or symptoms of CS, but is at risk for its development. These patients may include those with large acute myocardial infarction or prior infarction acute and/or acute on chronic heart failure symptoms.	Normal JVP Lung sounds clear Warm and well perfused • Strong distal pulses • Normal mentation	Normal labs • Normal renal function • Normal lactic acid	Normotensive (SBP ≥ 100 or normal for pt.) If hemodynamics done • cardiac index ≥ 2.5 • CVP < 10 • PA sat ≥ 65%
<b>B</b> Beginning CS	A patient who has clinical evidence of relative hypotension or tachycardia without hypoperfusion.	Elevated JVP Rales in lung fields Warm and well perfused • Strong distal pulses • Normal mentation	Normal lactate Minimal renal function impairment Elevated BNP	SBP < 90 OR MAP < 60 OR > 30 mmHg drop from baseline Pulse ≥ 100 If hemodynamics done • cardiac index ≥ 2.2 • PA sat ≥ 65%
<b>C</b> Classic CS	A patient that manifests with hypoperfusion that requires intervention (inotrope, pressor or mechanical support, including ECMO) beyond volume resuscitation to restore perfusion. These patients typically present with relative hypotension.	<i>May Include Any of:</i> Looks unwell Panicked Ashen, mottled, dusky Volume overload Extensive rales Killip class 3 or 4 BiPAP or mechanical ventilation Cold, clammy Acute alteration in mental status Urine output < 30 mL/h	<i>May Include Any of:</i> Lactate ≥ 2 Creatinine doubling OR > 50% drop in GFR Increased LFTs Elevated BNP	<i>May Include Any of:</i> SBP < 90 OR MAP < 60 OR > 30 mmHg drop from baseline AND drugs/device used to maintain BP above these targets Hemodynamics • cardiac index < 2.2 • PCWP > 15 • RAP/PCWP ≥ 0.8 • PAPI < 1.85 • cardiac power output ≤ 0.6
<b>D</b> Deteriorating/ doom	A patient that is similar to category C but are getting worse. They have failure to respond to initial interventions.	<i>Any of stage C</i>	<i>Any of Stage C AND:</i> Deteriorating	<i>Any of Stage C AND:</i> Requiring multiple pressors OR addition of mechanical circulatory support devices to maintain perfusion
<b>E</b> Extremis	A patient that is experiencing cardiac arrest with ongoing CPR and/or ECMO, being supported by multiple interventions.	Near Pulselessness Cardiac collapse Mechanical ventilation Defibrillator used	"Trying to die" CPR (A-modifier) pH ≤ 7.2 Lactate ≥ 5	No SBP without resuscitation PEA or refractory VT/VF Hypotension despite maximal support